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ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)			KUNEMUND, ROBERT M	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONALD H. WISEMAN

Appeal 2009-003004
Application 10/707,909
Technology Center 1700

Decided¹: May 29, 2009

Before ADRIENE LEPIANE HANLON, TERRY J. OWENS, and
ROMULO H. DELMENDO *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from a final rejection of claims 1-28. (Appeal Brief filed February 5, 2007, hereinafter “App. Br.”;

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

Final Office Action mailed March 17, 2005). We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

STATEMENT OF THE CASE

Appellant states that the claimed invention relates to “a crystal grower [i.e., crystal growing apparatus] having an integrated Litz coil induction heater” (Specification, hereinafter “Spec.,” ¶ 0001).

Claims 1, 9, 17, and 21, the only independent claims on appeal, read as follows:

1. A crystal growing apparatus comprising:
 - a receptacle constructed to receive a material selected to grow a crystal;
 - an induction heater having a Litz coil and constructed to heat the material; and
 - a housing positioned about the induction heater and constructed to receive the receptacle therein.
9. An induction heater comprising:
 - a casing having a first end and a second end;
 - a coil of woven strands of wire having a first end and a second end and passing through the casing;
 - a lead connected to an end of the coil of woven strands of wire and having a passage therethrough, the passage constructed to provide coolant to a space between the coil of woven strands of wire and the casing; and
 - at least one support leg extending along a coiled portion of the casing and constructed to retain the casing in a coiled position.
17. A method of manufacturing a crystal grower comprising:
 - providing a reservoir to receive a crystal growing material therein; and

coiling a Litz coil to receive the reservoir within a coiled portion of the Litz coil; and

attaching at least one leg to the coiled portion of the Litz coil to maintain a coiled orientation of the coiled portion of the Litz coil.

21. A method of growing a crystal comprising the steps of:

placing a crystal growing material in a vessel; and

energizing a coil of wire that has Litz characteristics and that is wound about the vessel and held in a coiled position by a housing formed thereabout.

The Examiner relied upon the following as evidence of unpatentability:

Haldeman	5,461,215	Oct. 24, 1995
Von Ammon ²	6,117,230	Sep. 12, 2000

The Examiner rejected the appealed claims under 35 U.S.C. § 103(a) as follows:

- (i) claims 1, 2, 9-11, 16-18, and 20 as unpatentable in view of the combined teachings of Haldeman and Von Ammon (Examiner's Answer mailed July 17, 2006, hereinafter "Ans.," 3);
- (ii) claims 3, 5-8, 12-15, and 19 as unpatentable in view of the combined teachings of Haldeman and Von Ammon (*id.*); and
- (iii) claims 4 and 21-28 as unpatentable in view of the combined teachings of Haldeman and Von Ammon (*id.* at 4).

ISSUES

² The Examiner refers to Von Ammon as "Ammon et al." *But see* the Certificate of Correction in Von Ammon.

The Examiner found that Haldeman teaches every limitation of independent claim 1 except for the housing means (Ans. 3). To account for this difference, the Examiner relied on Von Ammon, which the Examiner found “teaches a czochralski apparatus where there is a housing [that] surrounds heating coils” (*id.*). The Examiner then concluded that “[i]t would have been obvious to one of ordinary skill in the art to modify the Haldeman reference by the teachings of the [Von] Ammon et al reference to include a housing in order to prevent the heater from deforming and creating impurities in the process” (*id.*). With regard to claim 9, the Examiner concluded that “[o]ne of ordinary skill in the art would change and know to change the heater set up like the supports in order for the Litz coil heater [of Haldeman] to work properly (*id.* at 7). With regard to claim 17, the Examiner determined that “[i]t would have been obvious to one of ordinary skill in the art to attach a leg for stability” (*id.* at 8). With regard to independent claim 21, the Examiner found that Haldeman and Ammon differ from the claimed subject matter “in the method of growth” (*id.* at 4). Nevertheless, the Examiner concluded that “it would have been obvious to one of ordinary skill in the art to determine the optimum, operable means of growth which best use the Litz coils in the Haldeman reference in order to decrease energy use in the crystal growing methods” (*id.*).

Appellant, on the other hand, argued that Haldeman discloses that the induction heater is isolated from the melt by an enclosure and therefore “encapsulation of the heater [in a housing as in claim 1] is not necessary or desired” (App. Br. 9). Furthermore, with respect to claim 9, Appellant asserted that “the induction heater of Haldeman does not (1) include at least one support leg which extends along a coiled portion of the casing and (2)

include at least one support leg constructed to retain the casing in a coiled position" (*id.* at 13). With respect to claim 17, Appellants asserted that the prior art of record does not disclose "attaching at least one leg to the coiled portion of a Litz coil *to maintain a coiled orientation of the coiled portion of the Litz coil*" (*id.* at 16). Finally, with respect to claim 21, Appellants asserted:

Haldeman fails to disclose positioning any housing about the induction heater thereof [as in claim 21]. In fact, in disclosing that the induction heater is deformable to allow heating of a plurality of parts having . . . different shapes and sizes, Haldeman teaches away from any extraneous retention of the induction heater. Furthermore, it is the material and not any "housing", or tube 19 of Von Ammon et al. which maintains the heater disclosed therein in a coiled position [Br. 17].

Thus, the issues arising from the contentions of the Examiner and Appellant are:

Has Appellant shown reversible error in the Examiner's conclusion that one of ordinary skill in the art would have been led to provide Haldeman's crystal growth apparatus with a housing as taught by Von Ammon to arrive at the claimed subject matter of claims 1 and 21?

Has Appellant shown reversible error in the Examiner's conclusion that a person of ordinary skill would have provided Haldeman's apparatus with legs, as recited in claims 9 and 17, in order for the Litz coils to work properly and to provide stability?

FINDINGS OF FACT

1. Haldeman discloses:

Radio frequency (RF) induction heating is ideally suited for material-processing technology and has been

used for many years for melting, brazing, heat treating and crystal growth. In semiconductor processing, the main reason to prefer induction heating is cleanliness. Only the susceptor and wafer are subjected to high temperatures and the heating coil can be located outside the physical enclosure [col. 1, ll. 11-17].

2. Haldeman discloses:

The present invention is directed to an RF transmission cable, transformer primary or secondary winding with specific application to an induction heating coil for generating a time varying magnetic field to induce electric current formation in an electrically conducting workpiece. The coil comprises: a litz cable comprising a bundle of mutually electrically insulated, intermixed wire filaments, and a coolant tube, surrounding the litz wire, for conveying a fluid for removing heat generated by the litz cable [col. 1, ll. 33-41].

3. Haldeman discloses that the induction heating coil is flexible to permit its use for different heating applications by reorienting the coil turns without re-constructing the coil for each new workpiece and can be deformed elastically to provide a nominal turn radius ranging from long stretched out and short multi-turn (col. 3, ll. 61-64; col. 4, l. 66 to 5, l. 2).
4. Von Ammon's Fig. 5 is reproduced below:

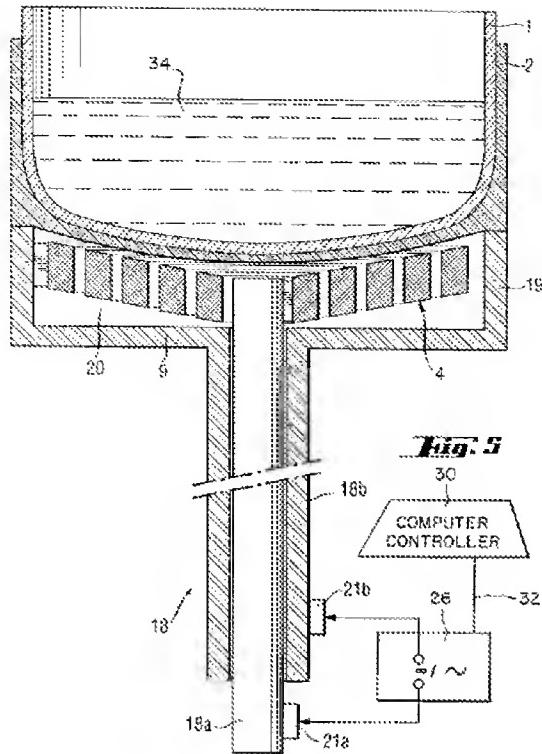


Fig. 5 depicts a crucible 1 containing a silicon melt 34, wherein the crucible 1 is embedded in a support crucible 2 and a bottom heater 4 is arranged below the crucible (col. 3, ll. 25-30).

5. Von Ammon discloses: “Together with the tube 19 and a support crucible 2, the base plate [9] forms a cavity 20 which contains the bottom heater 4” (col. 4, ll. 42-44).
6. Von Ammon teaches that “[t]he bottom heater 4 comprises essentially a coil which is preferably made of graphite, CFC (carbon fiber composite) or metals such as molybdenum or tantalum” (col. 3, ll. 34-36).
7. Von Ammon discloses that the turns of the coil lead in widening paths from an inner electrical connection to an outer electrical connection,

- wherein the turns “may be arranged in a single layer or in a plurality of layers, one above the other” (col. 3, ll. 36-43).
8. Von Ammon teaches: “The bottom heater is substantially enclosed in the cavity, so that impurities originating from it cannot reach the melt via the gas phase (col. 4, ll. 44-46).

PRINCIPLES OF LAW

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007).

While *KSR* explains that an obviousness “analysis need not seek out precise [prior art] teachings,” it nonetheless did not dispense with the need, in relevant cases, for evaluating the evidence to determine whether a person having ordinary skill in the art would have had “an apparent reason to combine the known elements in the fashion claimed.” *Id.* at 418.

ANALYSIS

We agree with Appellant that the Examiner erred in concluding that a person having ordinary skill in the art would have been led to combine the teachings of Haldeman and Von Ammon by providing Haldeman’s crystal growth apparatus with Von Ammon’s housing. Contrary to the Examiner’s position, the evidence of record does not support the conclusion that a person having ordinary skill in the art would have combined the two

references by providing Von Ammon's housing in Haldeman to prevent Haldeman's heater from deforming and creating impurities in the process.

Specifically, the Examiner found that Haldeman discloses a crystal growth apparatus including a receptacle (vessel), but not a housing (Fact 1; Ans. 3). To account for this difference the Examiner relied on Von Ammon, which teaches a crystal growth apparatus including, *inter alia*, a crucible containing melt for forming crystals and an induction heater coil, preferably made of graphite, CFC (carbon fiber composite), or metals such as molybdenum or tantalum, wherein the coils of the heater lead in widening paths from an inner electrical connection to an outer electrical connection (Facts 4, 6, and 7). To prevent impurities from reaching the melt, Von Ammon teaches that the heater is positioned under the crucible and is enclosed by a housing (Facts 4, 5, and 8).

Unlike Von Ammon, however, Haldeman discloses an enclosed crystal growth apparatus in which the induction heater is outside the physical enclosure (Fact 1). As such, a person having ordinary skill in the art would have understood that Haldeman's crystal growth apparatus is not susceptible to the same problem as in Von Ammon's crystal growth apparatus (*i.e.*, impurities from the heater reaching the melt). Thus, the Examiner has not adequately explained why a person having ordinary skill in the art would have been led to combine Haldeman's teaching of an enclosed vessel having an outside heater for crystal growth with Von Ammon, which is directed to a crystal growth apparatus having a housing to shield an open vessel containing melt from impurities originating from the heater.

The Examiner's alternate reason to combine the teachings of Haldeman and Von Ammon (*i.e.*, to prevent Haldeman's heater from

deforming) is also insufficient to show that one of ordinary skill in the art would have been led to combine the prior art teachings. Haldeman discloses a coil comprising a “litz cable” within a coolant tube, wherein the coil is flexible and elastically deformable such that the coil can be reoriented for use in different heating applications (Fact 2 and 3). Indeed, the Examiner states:

The Haldeman reference is merely teaching that a Litz coil can be made of various shapes and sizes. The reference is showing that this heater can be made to wrap around many various materials and of differing shapes. . . . The reference at no point teaches or suggests that the Litz coils change shape during heating and[/]or not stable. This is simply not the case. The Haldeman reference teaches that the coil can be made of different materials. Thus, the Litz coil will remain the same shape and be usable in a seed pulling apparatus [Ans. 5].

Furthermore, the Examiner asserts:

The Haldeman reference does not teach that the heater moves, uncoils during use. This simply does not happen [*id.* at 8].

Thus, the Examiner does not provide sufficient evidence or reasoning that Haldeman’s crystal growth apparatus and induction heater is susceptible to the deformation problem that would lead one of ordinary skill in the art to add a housing. For these reasons, we find that the Examiner erred in concluding that independent claims 1 and 21 (and their respective dependent claims 2-8 and 22-28) would have been obvious in view of the prior art.

With regard to independent claims 9 and 17, the Examiner did not identify any element in Haldeman or Von Ammon that corresponds to the claimed leg (Ans. 3). With regard to claim 9, the Examiner stated:

[T]he combination of references . . . uses the heater of Haldeman. . . . Clearly, a different heater would not have the exact same set up as set forth in [Von] Ammon et al. One of

ordinary skill in the art would change and know to change the heater set up like the supports in order for the Litz coil heater to work properly [Ans. 7].

With regard to claim 17, the Examiner stated:

It would have been obvious to one of ordinary skill in the art to attach a leg for stability. Also, one of ordinary skill in the art is not going to want to have a heater, which moves during the process. This could and would lead to the growth of bad crystals [Ans. 8].

Thus, with respect to these two claims, the Examiner's position is that a person of ordinary skill would have provided Haldeman's apparatus with legs in order for the Litz coils to work properly and to provide stability.

We do not agree with the Examiner's obviousness conclusion because the Examiner did not identify sufficient evidence or reasoning (not based on hindsight) that supports the Examiner's assertions. As discussed above, the Examiner acknowledges that Haldeman's induction heater coil will remain the same shape during heating and that Haldeman does not teach or suggest that the Litz coils are not stable (Ans. 5 and 7-8). This contradicts the Examiner's conclusion that one of ordinary skill in the art would have been led to provide a leg to support Haldeman's shape-maintaining, stable heater coil. For this reason, the Examiner has not established a *prima facie* case of obviousness for independent claims 9 and 17 and their respective dependent claims 10-16 and 18-20.

CONCLUSION

Appellant has shown reversible error in the Examiner's conclusion that one of ordinary skill in the art would have been led to provide

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Haldeman's crystal growth apparatus with a housing as taught by Von Ammon to arrive at the claimed subject matter of claims 1 and 21.

Appellant has shown reversible error in the Examiner's conclusion that a person of ordinary skill would have provided Haldeman's apparatus with legs, as recited in claims 9 and 17, in order for the Litz coils to work properly and to provide stability.

DECISION

We reverse the Examiner's decision to reject the appealed claims under 35 U.S.C. § 103(a) as follows:

- (i) claims 1, 2, 9-11, 16-18, and 20 as unpatentable in view of the combined teachings of Haldeman and Von Ammon;
- (ii) claims 3, 5-8, 12-15, and 19 as unpatentable in view of the combined teachings of Haldeman and Von Ammon; and
- (iii) claims 4 and 21-28 as unpatentable in view of the combined teachings of Haldeman and Von Ammon.

REVERSED

sss

ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON WI 53074